

3.0 INSTALLATION

This section describes how to install and replace the Power Supply module and Rack.

DANGER

THE USER IS RESPONSIBLE FOR CONFORMING WITH THE NATIONAL ELECTRICAL CODE AND ALL OTHER APPLICABLE LOCAL CODES. WIRING PRACTICES, GROUNDING, DISCONNECTS, AND OVER-CURRENT PROTECTION ARE OF PARTICULAR IMPORTANCE. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SERIOUS BODILY INJURY OR LOSS OF LIFE.

CAUTION

THIS EQUIPMENT MUST BE CONNECTED TO A POWER SOURCE FOR WHICH IT WAS DESIGNED. VERIFY THAT THE AVAILABLE POWER IS 115 VOLTS. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN DAMAGE TO EQUIPMENT.

3.1 Wiring

To reduce the possibility of electrical noise interfering with the proper operation of the control system, exercise care when installing the wiring between the system and the external devices. For detailed recommendations refer to IEEE 518.

The external wiring to the modules in the Rack must be carefully routed to minimize electrical noise and crosstalk between input and output wiring. Group and bundle wire types by similar electrical signals, being especially careful to separate low- and high-level control signals and A-C and D-C wiring.

If the 115 VAC input signal is subject to severe harmonic distortion, install a constant voltage transformer on the line. Use a 10KVA transformer to limit the fault current to acceptable levels in order to maintain UL listing of the Power Supply module.

3.2 Initial Installation

CAUTION

THE CABINET OR PANEL ON WHICH THE RACK IS MOUNTED MUST BE LOCATED IN AN AREA AWAY FROM OR SHIELDED FROM SOURCES OF EMI, SUCH AS RADAR BEAMS AND TRANSMISSION TOWERS. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT.

CAUTION

AIR FLOW AROUND THE RACK MUST BE SUFFICIENT TO DISSIPATE THE HEAT GENERATED BY ALL OF THE HARDWARE IN AND AROUND THE RACK. ALLOW AT LEAST TWO INCHES OF CLEARANCE ON EACH SIDE OF THE RACK. AVOID PLACING LARGE, HEAT-GENERATING EQUIPMENT UNDERNEATH THE RACK FANS. ADDITIONAL USER-SUPPLIED FAN COOLING OR AIR CONDITIONING IS REQUIRED IF THE AMBIENT TEMPERATURE EXCEEDS 60 C. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT.

CAUTION

THE RACK MUST BE LOCATED IN A CLEAN ENVIRONMENT. DO NOT EXPOSE THE RACK TO DRIPPING WATER OR CORROSIVE ATMOSPHERES CONTAINING CARBON DUST, METAL PARTICLES, OR OTHER CONTAMINANTS. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT.

Use the following procedure to install the Rack and Power Supply module. Before you begin, make certain that you have provided enough space for the Rack, wiring, and terminal strips or other devices that must be mounted near the Rack. Make certain that the panel is sturdy enough to support the Rack and all modules that it will hold. Including connectors attached to module faceplates, a fully-loaded 10-Slot Rack weighs between 70 and 80 lbs. A fully-loaded 16-Slot Rack weighs between 105-115 lbs.

- Step 1. Mount the Rack (10- or 16-Slot) on a panel or cabinet made of heavy gauge steel sturdy enough to hold the Rack, all of the hardware modules that will go into the Rack, and the terminal strip/connector assemblies for I/O modules. The connector end of each terminal strip/connector assembly is attached to the appropriate module faceplate. The terminal strip end of each assembly can be mounted on the panel itself or on lashing bars attached to the panel. Refer to the instruction manual for each individual module in your installation for more specific information. Follow the procedure below to install the Rack.
- a) Drill four holes in the panel using the appropriate mounting pattern in Appendix D.
 - b) In each hole, screw in one 1 1/4" 20-thread tap tite™ bolt, leaving approximately 1/8" to 1/4" of the thread exposed.
 - c) Remove the large belly band (labeled "AutoMax") from the rack by removing the three screws near the base holding it to the cable guide area.

- d) Position the Rack against the panel at a slight angle so that the bottom is a few inches away from the panel. Place the top of the Rack against the panel so that the upper two bolts are visible through the larger part of the bolt holes at the top of the Rack.

Carefully slide the Rack down so that the bolts are wedged in the top (smaller) area of the bolt holes, while at the same time moving the lower portion of the Rack toward the cabinet or panel onto the lower bolts. The lower bolts should be firmly wedged against the upper edge of the lower bolt holes on the Rack. Tighten all the bolts.

Step 2. Mount the Power Supply module in the Rack following the steps below.

- a) Take the Power Supply module out of its shipping container and anti-static bag, being careful not to touch the connectors on the back of the module.
- b) Remove the two keyswitch keys which are taped to the front of the module. Insert the module into the leftmost and widest slot in the Rack. Use a screwdriver to attach the module to the Rack. Store the keyswitch keys in a secure area.
- c) Connect the Battery Back-Up unit, if using. Plug one end of the Battery Back-Up cable into the Power Supply module faceplate connector labeled "BATTERY BACK UP". Plug the other end of the cable into the Battery Back-Up unit.

Step 3. Mount the terminal strip end of the terminal strip/connector assemblies for I/O modules on the panel or on lashing bars. The terminal strips should be mounted to permit easy access to the screw terminals. Make certain that the strips are close enough to the Rack so that the connecting cables will reach between terminal strips and the modules. Most cables are approximately 60" long.

Step 4. Fasten wiring for the external hardware to the terminal strips. Make certain that all field wires are securely attached. Label all terminal strips and field wires to allow easy reconnection at a later date.

For I/O modules, note carefully that bit numbers and wire numbers (located on wires between the faceplate connector and terminal strip) are not the same. Refer to the instruction manuals describing the modules in the installation section for more information.

Step 5. Take the Processor module(s) and other modules out of their shipping containers and insert them into the desired slots. See figure 2.4 for slot restrictions for certain modules. Use a screwdriver to attach the modules to the Rack.

Step 6. Attach the connector ends of the terminal strip/connector assemblies to their mating halves on the appropriate modules. Use a screwdriver to attach the connectors to the modules. Use the cable guides at the base of the rack to keep cables separate.

Note that in most cases both the connectors and their mating halves are equipped with movable "keys". These keys should be used to prevent the wrong connector from being plugged into a module in the event that the connector needs to be removed and then re-attached later.

At the time of installation, rotate the keys on the connector and the mating half on the module to mirror image positions so that they can be connected together securely. For all modules equipped with keys, the key on each successive module in the Rack should be rotated one position to the right of the key on the preceding module.

Step 7. Wire the Rack following the instructions below.

CAUTION

DO NOT CONNECT INCOMING A-C POWER DIRECTLY TO THE POWER SUPPLY MODULE FACEPLATE. CONNECT A-C POWER TO THE CORRECT TERMINALS ON THE RACK ONLY. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT.

- a) Ground the cabinet or panel on which the Rack will be mounted. Make certain that there is an unbroken path from the cabinet to the plant ground (earth).
- b) Connect incoming A-C power to the Rack as follows:

Rack Terminal Label	Input
189	115 VAC - (neutral)
188	115 VAC + (hot)

Cover the incoming wire ends with a Faston™ connector and attach them securely to the appropriate terminals using a screwdriver.

- c) Connect the power and ground wires from the Rack to the Power Supply module as follows:

Wire Color	Wire Label	Power Supply Faceplate Connector
black	L2	L2/N
orange	L1	L1
green	--	GND

The wires labeled L2 and L1 should remain twisted together as much as possible between the Rack and the Power Supply module.

Step 8. Using a screwdriver, re-attach the belly band to the base of the rack.

Step 9. Turn on power to the system.

DANGER

THE POWER SUPPLY MODULE OPERATES USING A-C INPUT VOLTAGE CAPABLE OF PRODUCING SEVERE SHOCK. MAKE CERTAIN THAT THE EXTERNAL A-C SUPPLY CIRCUIT IS TURNED OFF BEFORE INSERTING OR REMOVING THE MODULE OR ANY CONNECTING CABLES. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SERIOUS BODILY INJURY OR LOSS OF LIFE.

Step 10. Verify the installation by connecting the personal computer to the port labeled "PROGRAMMER/PORT B" on the leftmost Processor in the Rack and running the ReSource programming software. Use the I/O MONITOR function to attempt to read from or write to the registers on each of the modules in the Rack.

WARNING

BE CAREFUL TO INSURE THAT NO UNEXPECTED MACHINE MOTION WILL RESULT WHEN WRITING TO OUTPUTS. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY INJURY.

Refer to the instruction manuals describing other hardware in the installation for more information.

3.3 Power Supply Module Replacement

Use the following procedure to replace the Power Supply module:

Step 1. Turn off power to the Rack and all connections.

DANGER

THE POWER SUPPLY MODULE OPERATES USING A-C INPUT VOLTAGE CAPABLE OF PRODUCING SEVERE SHOCK. MAKE CERTAIN THAT THE EXTERNAL A-C SUPPLY CIRCUIT IS TURNED OFF BEFORE INSERTING OR REMOVING THE MODULE OR ANY CONNECTING CABLES. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SERIOUS BODILY INJURY OR LOSS OF LIFE.

- Step 2. Use a screwdriver to disconnect the terminal strip from the Power Supply module. Do not remove the wires from the terminal strip. Disconnect the Battery Back-Up cable, if used. Remove the belly band from the rack by removing the three screws near the base holding it to the cable guide area.
- Step 3. Use a screwdriver to loosen the screws holding the Power Supply module in the Rack and remove the module, being careful not to touch the connectors on the back. Store the module in the anti-static bag it came in.
- Step 4. Mount the replacement Power Supply module in the Rack following the steps below:
- a) Take the replacement Power Supply module out of its shipping container and anti-static bag, being careful not to touch the connectors on the back of the module.

- b) Remove the two keys to the keyswitch which are taped to the front of the module. Store the keyswitch keys in a secure area. Use a screwdriver to disconnect the terminal strip from the replacement Power Supply module.
- c) Insert the module into the leftmost and widest slot in the Rack. Use a screwdriver to attach the module to the Rack.
- d) Use a screwdriver to attach the terminal strip from the old Power Supply module to the replacement Power Supply module. Make certain that the connector is attached correctly by verifying that the wiring and the terminal labels on the faceplate match as follows:

Wire Color	Wire Label	Power Supply Faceplate Connector
black	L2	L2/N
orange	L1	L1
green	--	GND

- e) If you are using the Battery Back-Up unit, plug one end of the Battery Back-Up cable into the Power Supply module faceplate connector labeled "BATTERY BACK UP". Plug the other end into the Battery Back-Up unit.
- f) Using a screwdriver, re-attach the belly band to the base of the rack.

Step 5. Turn on power to the system.

Step 6. Verify the installation by connecting the personal computer to the port labeled "PROGRAMMER/PORT B" on the leftmost Processor in the Rack and running the ReSource programming software. Use the I/O MONITOR function to attempt to read from or write to the registers on each of the modules in the Rack.

WARNING

BE CAREFUL TO INSURE THAT NO UNEXPECTED MACHINE MOTION WILL RESULT WHEN WRITING TO OUTPUTS. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY INJURY OR DAMAGE TO EQUIPMENT.

Refer to the instruction manuals describing the specific hardware in the installation for more information.

3.4 Rack Replacement

Use the following procedure to replace the Rack:

Step 1. Turn off power to the Rack and all connections.

DANGER

THE POWER SUPPLY MODULE OPERATES USING A-C INPUT VOLTAGE CAPABLE OF PRODUCING SEVERE SHOCK. MAKE CERTAIN THAT THE EXTERNAL A-C SUPPLY CIRCUIT IS TURNED OFF BEFORE INSERTING OR REMOVING THE MODULE OR ANY CONNECTING WIRES. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SERIOUS BODILY INJURY OR LOSS OF LIFE.

- Step 2. Using a screwdriver, remove the belly band from the rack by removing the three screws near the base holding it to the cable guide area. Loosen all the screws holding connectors to the modules in the Rack. Remove the connectors. Disconnect the wires attached to the terminal strip on the Power Supply module.
- Step 3. Use a screwdriver to loosen the screws holding all modules, including the Power Supply module, in the Rack. Take all of the modules out of the Rack, being careful not to touch the connectors on the back.
- Step 4. Loosen the bolts that hold the rack to panel approximately 1/8"-1/4". Lift the Rack slightly while holding it against the panel until both top bolts are positioned in the larger bolt holes and the lower two bolts have cleared the smaller holes. Pull the Rack away from the panel and set aside.
- Step 5. Position the replacement Rack against the panel at a slight angle so that the bottom is a few inches away from the panel. Place the Rack against the panel so that the upper two bolts are visible through the larger part of the bolt holes at the top of the Rack.
- Carefully slide the Rack down so that the bolts are wedged in the top (smaller) area of the bolt holes, while at the same time moving the lower portion of the Rack toward the cabinet or panel onto the lower bolts. The lower bolts should be firmly wedged against the upper edge of the lower bolt holes on the Rack. Tighten all the bolts.
- Step 6. Insert the Power Supply module into the leftmost and widest slot in the Rack. Use a screwdriver to attach the module to the Rack.
- Step 7. If you are using the Battery Back-Up unit, plug one end of the Battery Back-Up cable into the Power Supply module faceplate connector labeled "BATTERY BACK UP". Plug the other end into the Battery Back-Up unit.
- Step 8. Insert the Processor module(s) and other modules. Use a screwdriver to attach the modules to the Rack.
- Step 9. Use a screwdriver to attach the connectors to their mating halves on the appropriate modules.
- Step 10. Connect 115 VAC power to the Rack following the instructions below.

CAUTION

DO NOT CONNECT INCOMING A-C POWER DIRECTLY TO THE POWER SUPPLY MODULE FACEPLATE. CONNECT POWER TO THE CORRECT TERMINALS ON THE RACK ONLY. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT.

- a) Make certain that there is an unbroken path from the cabinet to the plant ground.
- b) Connect incoming A-C power to the Rack as follows:

Rack Terminal Label	Input
189	115 VAC - (neutral)
188	115 VAC + (hot)

Cover the incoming wire ends with a Faston™ connector and attach them securely to the appropriate terminals using a screwdriver.

- c) Connect the power and ground wires from the Rack to the Power Supply module as follows:

Wire Color	Wire Label	Power Supply Faceplate Connector
black	L2	L2/N
orange	L1	L1
green	--	GND

The wires labeled L2 and L1 should remain twisted together as much as possible between the Rack and the Power Supply module.

- Step 11. Using a screwdriver, re-attach the belly band to the base of the rack.
- Step 12. Turn on power to the system.
- Step 13. Verify the installation by connecting the personal computer to the port labeled "PROGRAMMER/PORT B" on the leftmost Processor in the Rack and running the ReSource programming software. Use the I/O MONITOR function to attempt to read from or write to the registers on each of the modules in the Rack.

WARNING

WHEN WRITING TO OUTPUTS, BE CAREFUL TO INSURE THAT NO UNEXPECTED MACHINE MOTION WILL RESULT. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY INJURY OR DAMAGE TO EQUIPMENT.

Refer to the instruction manuals describing the specific hardware in the installation for more information.